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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,307	09/27/2006	Hiroynki Yamazaki	NE353-PCT(US)	3548

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EXAMINER
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ZHANG, YUANDA

ART UNIT	PAPER NUMBER
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2828

MAIL DATE	DELIVERY MODE
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09/16/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/594,307

**Applicant(s)**

YAMAZAKI, HIROYUKI

**Examiner**

YUANDA ZHANG

**Art Unit**

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SE/08)  
Paper No(s)/Mail Date 09/27/06;02/07/08;07/14/08
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 11 is objected to because of the following informalities: claim 11 depends on claim 10, not claim 9. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1- are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones (US Patent 6,959,028 B2) in view of Po (US Patent 4,852,117).
4. In re claim 1, with reference to figure 5, Jones discloses a tunable laser, comprising: a single ring resonator (40) (col. 3 lines 56-63); a LD-side waveguide (44) whose one end is connected to one end of the ring resonator through evanescent coupling (col. 3 lines 56-63); a reflection-side waveguide (46) whose one end is connected to the other end of the ring resonator through evanescent coupling (col. 3 lines 56-63); a single board (silicon substrate 50) on which the ring resonator, the LD-side waveguide and the reflection-side waveguide are formed (col. 4 lines 35-39); a reflection film (an end of Bragg grating 42 having high reflectivity is equivalent to a reflection film as indicated in figure 4 as a reflective filter) provided to the other end of the reflection-side waveguide; a laser diode chip (22) having a low reflection film (AR coating) formed on one of the two opposing emission end faces, which is optically

coupled to the LD-side waveguide through the low reflection film (col. 3 lines 28-34); and a tuning device for changing resonance wavelength of the multiple ring resonator (tuning is achieved by utilizing the thermo-optic effect in which refractive index can be changed by heating the substrate) (col. 4 lines 38-43).

5. Jones does not disclose a multiple ring resonator in which a plurality of ring resonators, which are constituted with ring-type waveguides having optical path lengths different from each other, are coupled through an optical-coupling device.

6. With reference to figure 10, Po discloses a multiple ring resonator in which a plurality of ring resonators (pump loop 18" and additional loop 136), which are constituted with ring-type waveguides having optical path lengths different from each other ("the additional cavity is of slightly different length"), are coupled through an optical-coupling device (lateral coupling 141 & 142) (col. 13 lines 50-64).

7. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the tunable laser of Jones with a multiple ring resonator as taught by Po in order to obtain a waveguide with high selectivity (col. 3 lines 32-33).

8. In re claim 2, Po discloses wherein the multiple ring resonator contains at least two or more of the ring resonators (see figure 10).

9. In re claim 3, Jones discloses wherein the low reflection film of the laser diode chip is abutted against the LD-waveguide to be optically coupled (laser diode 22 is optically coupled to waveguide 44) (see figure 5).

10. In re claim 4, Po discloses wherein the low reflection film of the laser diode is optically coupled to the LD-side waveguide through an optical device (lateral coupler 130, col. 13 line 9 & also see figure 10).
11. In re claim 5, Po discloses wherein a lens is used as the optical device (col. 13 line 4 and also see figure 9).
12. In re claim 6, Po discloses wherein, in the plurality of ring resonators, diameters of the ring waveguides are set so that intervals of reflection peaks appearing periodically become different, and there generates resonance at a meeting point of the reflection peaks (inherent property of two ring resonators with different diameters coupled together).
13. In re claim 7, Po discloses wherein directional couplers are used as the optical-coupling devices (lateral couplers 130).
14. In re claim 8, Jones discloses wherein the tuning device changes refractive indexes of the ring-type waveguides of the ring resonators for changing resonance wavelength (col. 4 lines 38-43).
15. In re claim 9, same rejection as applied to claim 8 is maintained.
16. In re claim 13, Jones discloses wherein a stray light suppressing part (Bragg grating 42) for suppressing influence of a stray light that is emitted from an end face extended from one end of the reflection-side waveguide is provided (selecting desired wavelength for feedback purpose) (col. 3 lines 56-63).
17. In re claim 14, same rejection as applied to claim 13 is maintained (Bragg grating 42 is considered to be a filter).

18. In re claim 15, same rejection as applied to claim 13 is maintained (Bragg grating 42 is considered to be a light-receiving element).

19. In re claims 16, Jones / Po have disclosed the claimed invention except the laser diode chip is mounted on the board (the limitation of "by a passive alignment technique" is not considered because it's a product-by-process limitation). It would have been obvious to one having ordinary skill in the art at the time the invention was made to mount the laser diode on the same board since it was known in the art that mounting the laser diode on the same board with the waveguide makes the device more compact by reducing excessive space for extra board.

20. In re claim 17, Jones discloses wherein the light-receiving element is mounted on the board (silicon substrate 50) (see figure 5) (the limitation of "by a passive alignment technique" is not considered because it's a product-by-process limitation).

21. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones (US Patent 6,959,028 B2) and Po (US Patent 4,852,117) as applied to claim 1 above, and further in view of Margalit et al (US Patent 6,668,006 B1).

22. In re claims 10-11, Jones / Po have disclosed the claimed invention except a wavelength detecting device for detecting resonance wavelength of the multiple ring resonator. However, with reference to figure 10, Margalit et al disclose a wavelength detecting device (PD1 and PD2) for detecting resonance wavelength of the multiple ring resonator (col. 8 lines 23-26). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a photo-detector for detecting the

resonance wavelengths since it was known in the art that photo-detector is commonly used for detecting optical input.

23. In re claim 12, Jones / Po have disclosed the claimed invention except a control device for feedback-controlling resonance of the multiple ring resonator based on resonance wavelength information detected by the wavelength detecting device. However, with reference to figure 10, Margalit et al disclose a control device (Monitor) for feedback-controlling resonance of the multiple ring resonator based on resonance wavelength information detected by the wavelength detecting device (PD1 & PD2). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the tunable laser of Jones / Po with a control unit as taught by Margalit et al in order to obtain a desired wavelength by monitoring the optical power of the laser device.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YUANDA ZHANG whose telephone number is (571)270-1439. The examiner can normally be reached on Monday-Thursday, 7:30am-6:00p EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2828

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/YZ/

09/04/08

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828